

I claim:

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1. A method of performing a reagent protocol using polymerase chain reaction, comprising:
    - (a) indexing patterns of reagent wells on a continuous basis through at least one step of reagent addition to said reagent wells; and then
    - (b) indexing said patterns of reagent wells on a continuous basis through a plurality of individual heat transfer stations, whereby at each of said individual heat transfer stations, said patterns of reagent wells are subjected to a unique temperature change to cause one amplification step, with said plurality of individual heat transfer stations providing total amplification required for said protocol.
  2. A method, as defined in Claim 1, further comprising: the step of sealing said reagent wells following step (a).
  3. A method, as defined in Claim 1, further comprising: providing said reagent wells disposed in patterns of said reagent wells in a thin thermoplastic web.

4. A method, as defined in Claim 4, further comprising: forming said reagent wells in said thermoplastic web by means of embossing.

5. A method, as defined in Claim 4, further comprising: forming said reagent wells in said thermoplastic web by means of thermoforming.

6. A method, as defined in Claim 3, further comprising: providing precision located indexing holes defined through an edge of said thermoplastic web to accommodate a tractor type of position controlled indexing drive.

7. A method, as defined in Claim 1, further comprising: providing a variable code of holes defined through said thermoplastic web to provide positive identification of each said patterns of reagent wells.

8. A method, as defined in Claim 1, further comprising: providing at each heat transfer station clamping and sealing means to bring a heat exchanger compartment in direct contact with an external surface of said reagent wells.

9. A method, as defined in Claim 8, further comprising: providing a heat exchange fluid to flow through said heat exchanger compartment, said heat exchanger fluid being controlled at a unique temperature, thereby effecting heat transfer to said reagent wells by means of conduction.

10. A method, as defined in Claim 9, further comprising: flowing said heat exchanger fluid through said heat exchanger compartment for a controlled time period to cause the function of denaturing, annealing, and/or extension in a polymerase chain reaction protocol.

11. A method, as defined in Claim 10, further comprising: providing means to remove a seal layer from said reagent wells after necessary amplification steps to provide access to amplified reagents.

12. An apparatus for performing a reagent protocol using polymerase chain reaction, comprising:

- (a) means to index patterns of reagent wells on a continuous basis through at least one step of reagent addition to said reagent wells; and
- (b) means to index said patterns of reagent wells on a continuous basis through a plurality of individual heat transfer stations, whereby at each of said individual heat transfer stations, said patterns of reagent wells are subjected to a unique temperature change to cause one amplification step, with said plurality of individual heat transfer stations providing total amplification required for said protocol.

13. An apparatus, as defined in Claim 12, further comprising: means to seal said reagent wells following said at least one step of reagent addition to said wells.

14. An apparatus, as defined in Claim 12 wherein: said reagent wells are disposed in patterns of said reagent wells in a thin thermoplastic web.

15. An apparatus, as defined in Claim 14, wherein:  
said reagent wells are formed in said thermoplastic web by  
embossing.

16. An apparatus, as defined in Claim 14, wherein:  
said reagent wells are formed in said thermoplastic web by  
thermoforming.

17. An apparatus, as defined in Claim 14, further  
comprising: a plurality of precision located indexing holes  
defined through an edge of said thermoplastic web to  
accommodate a tractor type of position controlled indexing  
drive.

18. An apparatus, as defined in Claim 17, wherein:  
said tractor type of position controlled indexing drive is  
selected from the group consisting of: walking beams, cam  
drives, geneva motions, electronic stepper drives, and  
pneumatic indexing mechanisms.

19. An apparatus, as defined in Claim 12, further  
comprising: a variable code of holes defined through said  
thermoplastic web to provide positive identification of each  
said patterns of reagent wells.

20. An apparatus, as defined in Claim 19, further comprising: means to sense said holes, said means to sense said holes being selected from the group consisting of: physical contact, pneumatic sensing, and photometric sensing.

21. An apparatus, as defined in Claim 12, further comprising: at least one single or multiple well pipettor to accomplish said at least one step of reagent addition.

22. An apparatus, as defined in Claim 21, further comprising: said at least one single or multiple well pipettor is adapted to transfer reagents from reservoirs of single or multiple reagents to said reagent wells.

23. An apparatus, as defined in Claim 22, wherein: said reservoirs of reagents are refillable or exchanged automatically from stacks to provide continuous operation.

24. An apparatus, as defined in Claim 13, wherein: said patterns of reagent wells can be sealed to provide a liquid tight but peelable seal as provided by pressure sensitive adhesive or heat seal methods.

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25. An apparatus, as defined in Claim 13, wherein:  
separate heat exchanger compartments can be clamped to a  
lower surface of said thermoplastic web to form a liquid  
tight seal around individual said patterns of reagent wells.

26. An apparatus, as defined in Claim 25, further  
comprising: means to cause heat exchange fluid to flow  
through each of said separate heat exchanger compartments  
for specific time controlled periods.

27. An apparatus, as defined in Claim 13, further  
comprising: means to peel sealing material from a top of  
said thermoplastic web to provide access to said reagents by  
a single or multiple well pipettor.

28. An apparatus, as defined in Claim 27, further  
comprising: a heated pressure roller in contact with said  
sealing material to apply a line of heat across said  
thermoplastic web to soften bonding of said sealing material  
to said thermoplastic web to permit ease of removal by  
applying tension to said sealing material.

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